GOVERNMENT OF KHYBER PAKHTUNKHWA
PUBLIC HEALTH ENGINEEING DEPARTMENT

SOLARIZATION OF EXISTING WATER SUPPLY SCHEMES
ADP 131/140649 (2014-15)

BIDDING DOCUMENTS
(FINANCIAL PROPOSAL)

PACKAGE No. [ ]
DISTRICT [DISTRICT NAME]

APRIL 2015

OFFICE OF THE DEPUTY SECRETARY (TECHNICAL)
PUBLIC HELATH ENGINEEING DEPARTMENT 1-POLICE ROAD CIVIL SECRETRIAT
PESHAWAR

Bid Reference No. _____
(Name of Contract/Works)

To:

_____

_____

_____

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract. Specifications, Drawings and Bill of Quantities and Addenda Nos. _____for the execution of the above-named Works, we, the undersigned, offer to execute and complete such Works and remedy any defects therein in conformity with the Conditions of Contract. Specifications, Drawings, Bill of Quantities and Addenda for the sum of Rs. _____ (Rupees _____) or such other sum as may be ascertained in accordance with the said conditions.

2. We understand that all the Appendices/documents attached here to form part of this Bid.

3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of Rupees _____

   (Rs. _____) drawn in your favour or made payable to you and valid for a period of _____days beginning from the date Bids are opened.

4. We undertake, if our Bid is accepted, to commence the Works and to complete the whole of the Works comprised in the Contract within the time stated in bidding documents.

5. We agree to abide by this Bid for the period of _____ days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

6. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

7. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other bidder for the Works.

8. We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this _____day of_____20_____

Signature: _____

in the capacity of _____duly authorized to sign Bids for and on behalf of

_____

(Name of Bidder in Block Capitals)

(Seal)

Address:_____

_____

_____

Witness:

Signature: _____

Name: _____

Address. _____

_____

Occupation_____

SUMMARY OF BOQ

FOR SOLAR BASED PUMPING UNIT WITH AUTO SUN TRACKING

PACKAGE # [ ], DISTRICT [DISTRICT NAME]

S NO.	DESCRIPTION OF WORK	RATE (RS.)
1	WSS [SCHEME NAME]	
2	WSS [SCHEME NAME]	
3	WSS [SCHEME NAME]	
4	WSS [SCHEME NAME]	
4	WSS [SCHEME NAME]	
	TOTAL BID COST PACKAGE – 01	
AMOUNT IN WORD:		

BILL OF QUANTITIES

FOR SOLAR BASED PUMPING UNIT WITH AUTO SUN TRACKING

PACKAGE # [ ], DISTRICT [DISTRICT NAME]

Name of Work: WSS [SCHEME NAME]		
S No.	**Description of Work**	**Rate of complete unit including Pumping Machinery along-with all accessories.**
A	Supply & Installation of Solar Energy based Submersible Pump **(ISO – 9906 Certified)** Coupled with submersible Electric Motor Rewind-able, Water Cool capable of giving Discharge **____ IGPH** at Total dynamic Head **____ Feet** and pump Setting **____ Feet** along-with Solar Panel (A-Grade Mono-crystalline), Auto Sun Tracker, Controller /Inverter, Submersible Flat Cable, Riser Pipe, Top Set (Sluice Valves, Reflux Valve, Bend, Suspension Clamps, Bore Cover Plate, Cable Ties, Nut Bolts & Rubber Gaskets etc.) & steel frame and dry run protection complete in all respect as per attached specification..	
	Water Horse Power (HP/Watt)	
	Pump Efficiency %:	
	Motor Efficiency %:	
	Motor BHP (HP):	
	Motor Input Power (Watt):	
	Total PV Power (Wp):	

Note: Rate/Price of the complete unit, and not per watt rate shall be considered for bid evaluation. System design should be provided both in Technical and Financial bid.

S No.	**Description of Work**	**Qty.**	**Unit Rate (Rs.)**	**Amount (Rs.)**
B.	Supply installation and commissioning of solar system for lighting the pumping chamber & system premises for security including PV Modules of 550 Wp minimum, 300 AH Deep Cycle Gel/AGM Battery (150Ah/12V* 2 Nos), A DC Cabinet Box installed with Charge controller 24V/30Amps PWM, 02 Nos flood lights 30 Watts 24 Volts, 02 Nos 10 Watts 24 Volts LED lights, a single DC ceiling fan 56” 24V and a single Cell Phone Charger Complete in all respect.	01 Job.		
			Grand Total: (A+B):	

_____ **_____**

(Engineer Incharge) **(Contractor/Firms)**

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FOR SOLAR BASED PUMPING UNIT WITH AUTO SUN TRACKING

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	Motor Efficiency %:	
	Motor BHP (HP):	
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			Grand Total: (A+B):	

_____ **_____**

(Engineer Incharge) **(Contractor/Firms)**

SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF SOLAR BASED PUMPING UNITS

1. SOLAR PANELS :

- The PV module(s) shall contain mono crystalline silicon Grade-A solar cells.
- The PV module have an ability to Works well with high-voltage input Inverters/ charge controllers
- The PV Panel must have clear anodized aluminum frame with Anti-reflection cover glass
- The power output of the module(s) under STC should be at optimum level.
- The operating voltage corresponding to the power output must be mentioned.
- The open circuit voltage of the PV modules under STC must be mentioned.
- The terminal box on the module should have a provision for opening for replacing the cable, if required and it should be waterproof
- The Solar Panel shell meet the requirement set in IEC 61215:2005, IEC61730-1:2004 and IEC 61730-2:2004 and should be duly certified by TUV.
- A strip containing Serial number should be laminated inside the module so as to be clearly visible from front side.
- Limited performance guarantee: panel power, in standard conditions, will not be less than 90% of nominal power for first 10 years of operation and at least 80% for the second 20 years of operation with 25-year limited power warranty.
- The PV Module should have at least Five-year warranty.
- The PV Module should have over 14% Module efficiency.
- The solar panel supplied should be in compliance with the product specifications provided in the technical bid. All the technical parameters are to be provided with each solar panel supplied.

2. INVERTER/CONTROLLER: The solar pump controller should have built-in MPPT controller, Voltage Frequency (V/F) regulation, and over load protection. The make and origin of the inverter/controller should be clearly mentioned in the technical proposal. The inverter offered should comply to:

- CE/RoHS
- Low Voltage Directive 73/23/EEC with Supplements
- EMC Directive 89/336/EEC with Supplements

The complete datasheet showing all the electrical parameters like input & output voltage ranges should be provided in the technical bid.

3. **MOUNTING STRUCTURE:** The panel mounting structure should be made of hot dipped galvanized iron pipes, or epoxy coated mild steel pipes (minimum wall thickness 2.5 mm) and should have the provision for vertical (east to west) automatic Sun-Tracking. The structure quoted should be according to the drawing attached as Annexure-A or equivalent in strength, size and features.
4. **AUTO SUN TRACKING SYSTEM:** The solar tracker offered should be fully automatic and intelligent, and must be capable of single axis tracking (from east to west). The tracker control system should have both real time sun sensing in normal conditions and timer-based operation for cloudy hours. The control should have auto night return. There should be a separate power supply for tracking system.
5. **SYSTEM DESIGN/SIZING:** Suitable over sizing factors should be applied while designing the system in order to have compensations for variations in irradiance. The motor output (BHP) should be at least 20% more than the pump required input power (Shaft Power). Also the panel peak power at STC (Wp) should be **35%** more than the maximum required input power of the motor (motor consumption). The PV array size (Wp) should be calculated as under

$$PV\ Array\ Size\ (Wp) \geq \left(\frac{Discharge\ \left(\frac{m3}{hr}\right) * Head\ (m) * 9810}{3600 * Pump\ Eff.* Motor\ Eff.} \right) * \mathbf{1.35}$$

6. **PRE-SUPPLY TESTING & INSPECTION:** The firm applying for the tender must have test bed facility to carry out pump performance acceptance test witnessed by third party inspector/Client as per ISO-9906 standard. Each of the offered pump set models must undergo this witness test prior to supply and installation.

7. **DC CABLE / WIRING:** 99% copper wires to be used in DC wiring. The cable must have double insulation suitable for 1000 VDC transmission, and all the relevant test reports i.e.
   - Conductor resistance test.
   - Insulation resistance test.
   - Pressure test.
   - Spark test.

   are to be provided in the technical proposal. The wiring must be protected by PVC conduits for underground installations. DC circuit breakers (not fuse) of at least 800V and suitable ampere rating must be installed between PV modules and PV pump controller in order to avoid short-circuiting. No direct jointing in DC power line is allowed, junction boxes of at least IP-44 rating are to be used for easy debugging where necessary.

SPECIFICATIONS FOR PUMPING MACHINERY AS PER ISO-9906 STANDARD

1. **PUMP:** Pumps are to be supplied having standard ISO-9906 specifications. The pump must be submersible, made of stainless steel. The characteristic curves showing the efficiency and performance of the pumps are to be provided in the technical proposals. The quoted pump is to be tested for its performance and certified as per ISO-9906 standard. The pump must be suitable for installation and operation in tube wells/dug wells/open well with clear water discharge. Pump shall comprise of bowl assembly and non-return valve as integral part of pump's parts. Pump and motor shall rigidly couple through NEMA standard coupling. The stage casings of pumps should be connected as per NEMA/ANSI/AWWA/ASTM/BSS standard. Each stage casing must have replaceable wear ring. The impellers shall be secured to the pump shaft with tapered conical sleeves pressed into the taper bore of impeller or impeller secured through chrome plated stainless steel hexagonal sleeves. Suction casing must be between pump and motor with suction strainer as protection of pump against coarse impurities of the liquid handled.

SPECIFICATION FOR MAIN COMPONENTS OF THE PUMPS:

S NO	COMPONENTS	SPECIFICATIONS
1	Casing/Diffuser	The Casing/Diffuser should be in fabricated stainless steel AISI 304.
2	Impellers	stainless steel AISI 304
3	Driving Shaft	Stainless steel 304/420
4	Sleeves	Stainless steel AISI 329/ 304
5	Gaskets	Rubber Gaskets
6	Bearings	AISI 329 stainless steel
7	Coupling & Screen + Cable Guard	Stainless steel AISI 316/319/304/420
8	Non-Return Valve	As per British standard specifications (BSS), Minimum 16 bar pressure sustaining design
9	Pressure Gauge	As per British standard specifications (BSS),

		having PSI or Bar scale
10	Clamps	Steel – Pressed
11	Pump Efficiency	Minimum efficiency of the pump should be 65% at duty point

2. **<u>MOTOR</u>:** The origin, make and material of the motor should be clearly mentioned in the technical proposal. The winding material should be 99.99% copper. The motor should have wet type, water cool rewind-able/repairable stator. The motor should have non-disposable/non-hermetically sealed winding. The insulation class of the winding material should be mentioned. For each model quoted, all the technical parameters such as rated voltage, power factor, efficiency, full load ampere, speed and other similar parameters should be provided in the technical proposal. The testing report with all basic parameters should also be provided at the time of supply.

   The motor shall be manufactured in compliance with National Electrical Manufacturer Association (NEMA) standards. The motor shall be three-phase submersible and shall be capable of operating at rated voltage of 380 Volts at 50 Hz. The motor should be capable of operating with variable speed through V/F control. Winding of the motor shall of rewind able type with class – IC40 insulation and IP68 protection. The synchronous speed should be 2850-2950 RPM. Motor shall be capable of operating in well water with temperature starting form 40C. Motor should be designed for continuous operation. Motor must be filled with water without any chemical additives hazardous to health, for cooling. The motor must be properly protected against the entry of well water sand etc by double mechanical seal i.e. one rotating and other stationary and the seal must be made of Silicon carbide/ Tungsten carbide and must be protected with sand protection guards. All supports shall be high grade cast iron and stator outer side jacket body should be in stainless steel in AISI 304. The excessive pressure due to heating up of the filled water must be compensated by a pressure equalizing rubber diaphragm in the lower part of the motor. The axial thrust of the pump shall be countered by oscillating sliding block type thrust bearing. The thrust bearing of the motor should be able to bear a download thrust force from the water pump and the upward thrust force produced while starting the water pump. Motor shall be capable of minimum of 20 starts in an hour. Motor efficiency should not be less than 70%.

MATERIAL/TECHNICAL SPECIFICATIONS OF REWIND-ABLE WET STATORS, THREE PHASE SQUIRREL CAGE WATER FILLED SUBMERSIBLE MOTOR.

S. NO	COMPONENTS	SPECIFICATION
1.	Winding	Made of pure electrolyte copper a non-hygroscopic poly vinyl chloride for normal temperature and must full fill resistant tests range.
2.	Stator	Energy efficient low-losses electrical magnetic sheet should be fixed in stainless steel casing. M800 or M600 magnetic sheet are preferable to use.
3.	Rotor	Energy efficient low-losses electrical magnetic sheet fixed with high grade copper bars. M800 or M600 magnetic sheets are preferable to use.
4.	Spline Shaft	AISI 420 stainless steel, flange dimension according to NEAM standard, over size design to ensure stiffness n severs condition.
5.	Shaft bearing	Water lubricated guide/general bearings fixed in upper and lower brackets should be made of metal impregnated carbon.
6.	Lower thrust bearing	Thrust sliding block bearings, self aligning Mitchell type, should be able withstand **15500N/20000N** axial load.
7.	Mechanical Seal (Stationary & Rotary	Silicon carbide or tungsten carbide mechanical seal.
9.	Cooling filling fluid	Water mixed with non-toxic anti freeze provide cooling and lubrication also protect and prevent inside parts from corrosion.
11.	Degree of protection	IP68

12.	Insulation of Class	With winding wire poly vinyl chloride up to 70 degree C with winding wire polyethylene up to 95 degree C.
13.	Voltage Tolerance	-6% to -10%
14.	Mounting position	Vertical horizontal
15.	Class	IC40
16.	Maximum Immersion	150 Meters
17.	Stating per hour	20

3. **SUBMERSIBLE FLAT ELECTRIC CABLE:** The submersible cable should be made of 99% copper coated with double PVC, should be adequately flexible and environment friendly. The cable must have undergone quality tests as per BSS standards. Following lab tests are mandatory.
   - Conductor resistance test.
   - Insulation resistance test.
   - Pressure test.
   - Spark test.
   - Note: The Supplier should provide the quality tests certificates at the time of supply.

4. **COLUMN PIPE:** The column pipe shall be flanged ERW steel pipes confirming to ASTM designation A-53 with a minimum thickness of 3mm and shall be painted with corrosion resistance paint of suitable thickness. Flanges thickness of 20mm shall have grooves for cable passage. Each column pipe shall be complete with gaskets, bolts/studs, washers and nuts. All nuts, bolts, and washers shall be made of minimum A2 grade stainless steel.
   The column pipe shall be supplied in interchangeable section having an approximate length of 10 feet. The flanges should be welded perfectly perpendicular to the axis of the pipe.

FEATURES:

- Manufacturer's pipes should meet international standards like BSEN 10255 & ASTMA 53.

- Dimensional accuracy circularity and plan end cut should be observed,
- Weld strength of pipe and mechanical properties or raw material should be tested as per manufacturing standards.
- Pipes should be NDT tested (Non destructive – Eddy current)
- Pipes should be hydrostatically pressure as per manufacturing standard.
- Pipes should be gone through straightening process to remove bendiness.

5. **TOP SET:** Top set shall comprise of Bore covers plate, (covering bore hole completely and securely), installation/suspension clamps, sluice valve, reflex valve, connector and cable jointing material (Cable connection from motor to switching device shall be joint free) pressure gauge and cable ties.

SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF SOLAR BASED LIGHTING SYSTEM FOR PUMP HOUSE PREMISES

The bidders are also required to supply and install solar system with battery backup for lighting up the pump premises and ceiling fan in operator room. The specifications for the major components of the system are as under:

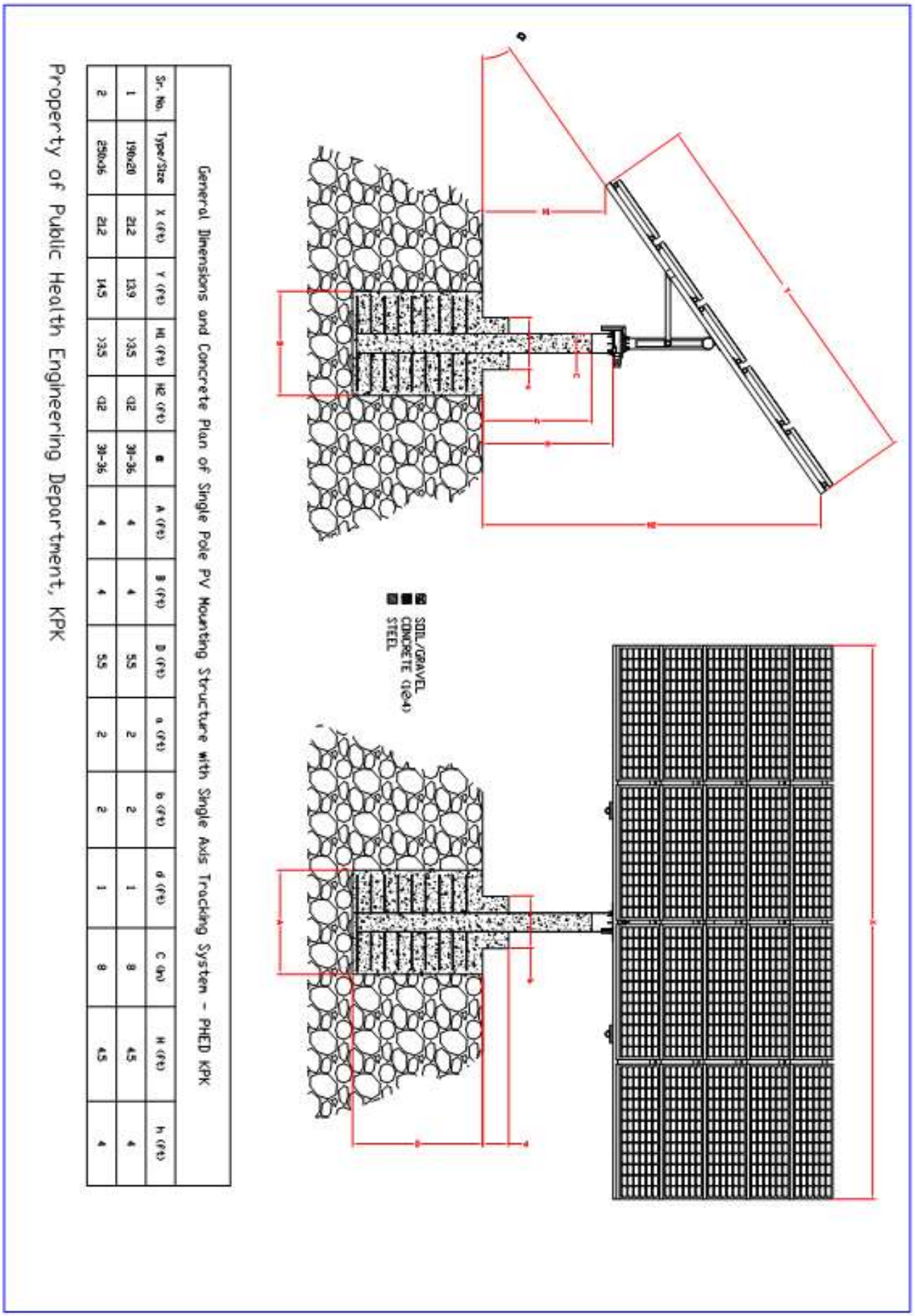
1. **PV Modules:** (As described in the specifications for supply and installation of solar based pumping units.)

2. **Battery:** The battery offered should comply to latest IEC and British standards. It should be maintenance free (VRLA AGM Type). The battery should have M6/M8 female terminals and ABS container.

3. **Flood lights:** The lights offered should have single LED with at least 80 Lumens per watt. The lights should have 220 VAC input. The lights offered should have IP-66 enclosure.

4. **DC Wiring:** (As described in the specifications for supply and installation of solar based pumping units.)

Annexure-A



General Dimensions and Concrete Plan of Single Pole PV Mounting Structure with Single Axis Tracking System - PHED KPK

Sr. No.	Type/Size	X (ft)	Y (ft)	H1 (ft)	H2 (ft)	θ	A (ft)	B (ft)	D (ft)	a (ft)	b (ft)	d (ft)	C (in)	H (ft)	h (ft)
1	190x20	21.2	13.9	13.5	12	30-36	4	4	5.5	2	2	1	8	45	4
2	250x36	21.2	14.5	13.5	12	30-36	4	4	5.5	2	2	1	8	45	4

Property of Public Health Engineering Department, KPK